

REMARKS

Claim 9 was rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9 has been canceled, and this rejection is now moot.

Claims 14 and 16 were rejected under 35 USC 112, second paragraph because of the use of the word “substantially” which is a relative term and the Examiner submits renders the claim indefinite. Claim 14 claims the process of claim 1 wherein the fuel gas contains substantially no nitrogen. Claim 16 claims the process of claim 1 wherein the external oxidant stream is substantially pure oxygen. The Examiner took the position to interpret pure oxygen as containing traces of nitrogen and other gases which are present in the different oxygen grades available in the market. The Applicants agree with this position and submit that one of ordinary skill in the art would have interpreted substantially in this manner to indicate the levels of nitrogen or other impurities that are commonly found in commercially available fuel gas (claim 14) or oxygen (claim 16).

Claims 1-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Farooque, US 4,917,971 (hereinafter the Farooque patent) in view of Hildebrandt et al., US 5,175,061 (hereinafter the Hildebrandt patent) in further view of Kahara et al., US 4,810,595 (hereinafter the Kahara patent). Applicants respectfully traverse this rejection based on the claims as currently amended.

The Farooque patent describes an internal reforming fuel cell system wherein the reforming reaction in the cell absorbs heat from the electrochemical reaction in the cell in an amount to substantially maintain the cell at a predetermined temperature. The process results in excess fuel gas but the Farooque patent describes the use of hydrogen utilization devices to improve the net utilization of the process gas.

The Hildebrandt patent describes the use of high temperature fuel cells with oxygen-enriched gas. The patent describes using a partial stream of the cathode outlet gas to regulate the fuel cell temperatures. The cathode outlet gas is cooled with production and/or superheating of steam.

The Kahara patent describes a method of restoring a molten carbonate fuel cell to its initial performance level by shutting off part or all of the reaction gases or reducing their feed for a while, and then restoring the feed of reaction gases.

It would not have been obvious to one of ordinary skill in the art to combine the teachings of the Farooque patent with the teachings of the Hildebrandt patent. The Farooque patent teaches that the fuel cell is operated such that the heat produced by the exothermic electrochemical reaction is the same as the heat required by the endothermic reforming reaction. This allows the fuel cell to be operated without any outside cooling. To achieve this result excess reforming must be conducted which results in excess process gas feed to the fuel cell. The Hildebrandt patent teaches the recycle of the cathode outlet gas to cool the fuel cell. It would not have been obvious to combine the teachings of these two patents because when operating according to the Farooque patent, there would be no need for the additional cooling taught by the Hildebrandt patent. The Kahara patent does not add any additional support for this combination.

In addition, with respect to the Farooque patent which is most heavily relied on by the Examiner, it appears that the Examiner has selected various unrelated teachings from the patent in making the obviousness rejection. The Examiner refers to Figure 3, but Figure 3 is a depiction of a conventional low temperature fuel cell, such as a phosphoric acid cell, not of a molten carbonate fuel cell. The Examiner also relies on the disclosure of the production of concentrated carbon dioxide, but this carbon dioxide stream is produced by the hydrogen transfer device and not by the molten carbonate fuel cell. The hydrogen transfer device described in the Farooque patent is of the type disclosed in US Patent 4,620,914 (see col. 4, lines 5-7) and is described in that patent as a low temperature fuel cell such as a phosphoric acid or sulfuric acid fuel cell. The Examiner has combined teachings related to a low temperature fuel cell with those related to a molten carbonate (high temperature) fuel cell and ascribed all of the teachings to the molten carbonate fuel cell. The disclosure of the Farooque patent cannot all be ascribed to a molten carbonate fuel cell as the Farooque patent deals with two different types of fuel cells that are operated in very different manners and which produce different results from each other.

It would not have been obvious to one of ordinary skill in the art to combine the teachings of the references cited here by the Examiner, and even if they were combined the combination would not teach all of the limitations of claim 1 which claims a process using a molten carbonate fuel cell.

In light of the above, Applicants respectfully request allowance of the amended claims of this application. Should the Examiner find any impediment to the allowance of this case that could be corrected by a telephone interview, the Examiner is requested to initiate such an interview with the undersigned.

Respectfully submitted,

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